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CENTRAL INTELLIGENCE AGENCY

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USE OF STEEL, ALUMINUM, AND COPPER CONDUCTORS AND BUS BARS IN ELECTROTECHNICAL INSTALLATIONS

In connection with the numerous requests from organizations and individuals on the correct use of "Rules for the Installation of Electrotechnical Equipment" and "Rules for Technical Exploitation of Electrical Equipment in Industrial Enterprises" with regard to the possible use of steel, aluminum, and copper conductors and bus bars, the Technical Division and other activities of the Ministry of Electric Power Stations, and Glavelektromontash of the Ministry of Construction of Heavy Industry Enterprises, in agreement with the State Engineering Administration of the USSR, introduced a resolution (№ 30/82/E dated 12/20/1948) which proposes that personnel be guided by the following instructions in the design, installation, and exploitation of these conductors and bus bars:

1. For overhead transmission lines with conductors having cross sections greater than 16 square millimeters (using copper), use conductors from steel-aluminum, aluminum (or authorized aluminum alloys), and steel.

The use of aluminum conductors is not permitted for lines with voltages of 110 kilovolts or more.

Copper conductors must be used for lines which pass close to the seashore or near chemical plants, where the conductors are subject to corrosion.

In repairing conductors of overhead lines, conductors from the same metals as in the original lines must be used.

2. Copper must be used for feeders to outdoor distribution centers and for the outdoor uncovered bus-bar conductors (bridges) from the electric station to the distribution centers.

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Steel tubing may be used for voltages from 35 to 110 kilovolts.

The use of steel, steel-aluminum, and aluminum and its alloys is permitted for the feeders to unimportant, dead-end, and temporary outdoor distribution centers for voltages up to 35 kilovolts inclusively and capacities up to 2,000 kilovolt-amperes.

If outdoor distribution centers are located close to the seashore or chemical plants, their feeders must be made from copper.

3. Aluminum is to be used for feeders into indoor distribution centers in all cases.

For alternating currents up to 200 amperes and for all direct currents, the use of steel feeders is permitted, along with aluminum. Steel tubing may be used for 35 and 110-kilovolt feeders.

4. Copper must be used for feeders into the cooling chambers of generators, synchronous condensers, and heavy-duty electric motors.

5. Aluminum may be used for the feeders of electrolytic and electric furnace equipment. The feeders for the furnaces and baths themselves, and also the connections between baths, should be aluminum or copper.

6. The feeders for storage batteries delivering up to 200 amperes should be steel; for batteries delivering over 200 amperes, copper should be used.

7. Aluminum may be used for all open and enclosed bus-bar conductors. Copper must be used for enclosed bus-bar conductors designed for more than 200 amperes with a great number of branches (every meter or less) and for plug bus-bar conductors.

Steel may be used, along with aluminum, for bus-bar conductors for alternating currents up to 200 amperes and for all direct currents, if its use does not cause construction difficulties.

8. Crane trolleys, as a rule, should be made from steel, with the exception of those cases where the use of steel is difficult because of structural considerations (for example, at the ends of the crane bridge for multimotor cranes).

9. Copper conductors and bus bars must be used for wiring in areas where explosions are possible, in shops having a corrosive medium, in mobile equipment, and in mechanisms undergoing continuous vibration (cars, ships, cranes, rolling mills, etc.), dwellings, theaters, motion-picture houses, clubs, schools, hospitals, and other buildings (museums, art galleries, libraries, etc.), and in secondary switching.

10. In exposed wiring and wiring in steel conduit using mark PR conductors, copper strands (PR) must be used for conductors up to 4 square millimeters in cross section; for cross sections of 6 square millimeters or more, conductors with aluminum strands (APR) must be used, with the exception of the cases enumerated in item 9.

Conductors with copper strands must be used for wiring in attics, even when conduit wiring is used.

The use of mark APR conductors for wiring in attics is permitted only in industrial buildings having fireproof ceilings and roofing when wiring in steel conduit is used.

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